

MEASUREMENT OF NITROGEN CONTENT IN A
GAS MIXTURE BY TRANSFORMING THE
NITROGEN INTO A SUBSTANCE DETECTABLE
WITH NONDISPERSIVE INFRARED DETECTION

Inventors: Thomas E. Owen, et al.

Attorney Docket: 090936.0505

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GAS COMPONENT (DISSOCIATION)	MOLE %	COMPUTATION PATH	IONIZATION POTENTIAL (eV)	CHEMICAL BOND STRENGTH (kJ/mol)
1-BUTANE AND C ₅ +	0.50	$C_4 H_{10} + e^- \rightarrow C_4 H_9^+ + H\cdot + 2e^-$	10.57	411.1
PROPANE	0.80	$C_3 H_8 + e^- \rightarrow C_3 H_7^+ + H\cdot + 2e^-$	10.95	413.0
ETHANE	1.50	$C_2 H_6 + e^- \rightarrow C_2 H_5^+ + H\cdot + 2e^-$	11.52	422.8
METHANE	95.00	$CH_4 + e^- \rightarrow CH_3^+ + H\cdot + 2e^-$	12.51	438.5
DILUENT CARBON DIOXIDE	1.30	$CO_2 + e^- \rightarrow CO^+ + O + 2e^-$	13.773	532.2
DILUENT NITROGEN	1.00	$N_2 + e^- \rightarrow N^+ + N + 2e^-$	15.581	945.3
METHYL (CH ₃ //CH ₄)		$CH_3^+ + e^- \rightarrow CH^{2+} + H\cdot + 2e^-$	9.84	1095.0
GAS COMPONENT (ASSOCIATION)	MOLE %	COMPUTATION PATH	ENTHALPY OF FORMATION (kJ/mol)	REQUIRED SOURCE COMPONENT
2-BUTANOL	0.4	$3CH_3\cdot + H\cdot + O \rightarrow C_3 H_{10} O$	658	CO ₂
ETHANOL	0.3	$2CH_3\cdot + O \rightarrow C_2 H_6 O$	776	CO ₂
ETHANOL	0.3	$C_2 H_6 + O \rightarrow C_2 H_6 O$	776	CO ₂
METHANOL	0.3	$CH_4 + O \rightarrow CH_4 O$	845	CO ₂
AMMONIA	2.0	$N + 3H\cdot \rightarrow NH_3$	934	N ₂
ETHANE	5.7	$2CH_3\cdot \rightarrow C_2 H_6$	1027	CH ₄
METHANE	91.0	$CH_3\cdot + H\cdot \rightarrow CH_4$	1133	CH ₄
2-BUTANOL		$H\cdot + O \rightarrow HO\cdot$	1293	CO ₂
HYDROXYL		$CH_3\cdot + HO\cdot \rightarrow CH_4 O$	845	CO ₂
METHANOL		$3CH_2\cdot + H\cdot + HO\cdot \rightarrow C_3 H_8 O$	704	CH ₃ /CO ₂
2-PROPANOL		$4CH_3\cdot + 2H\cdot + O \rightarrow C_4 H_{10} O$	658	CH ₃ /CO ₂

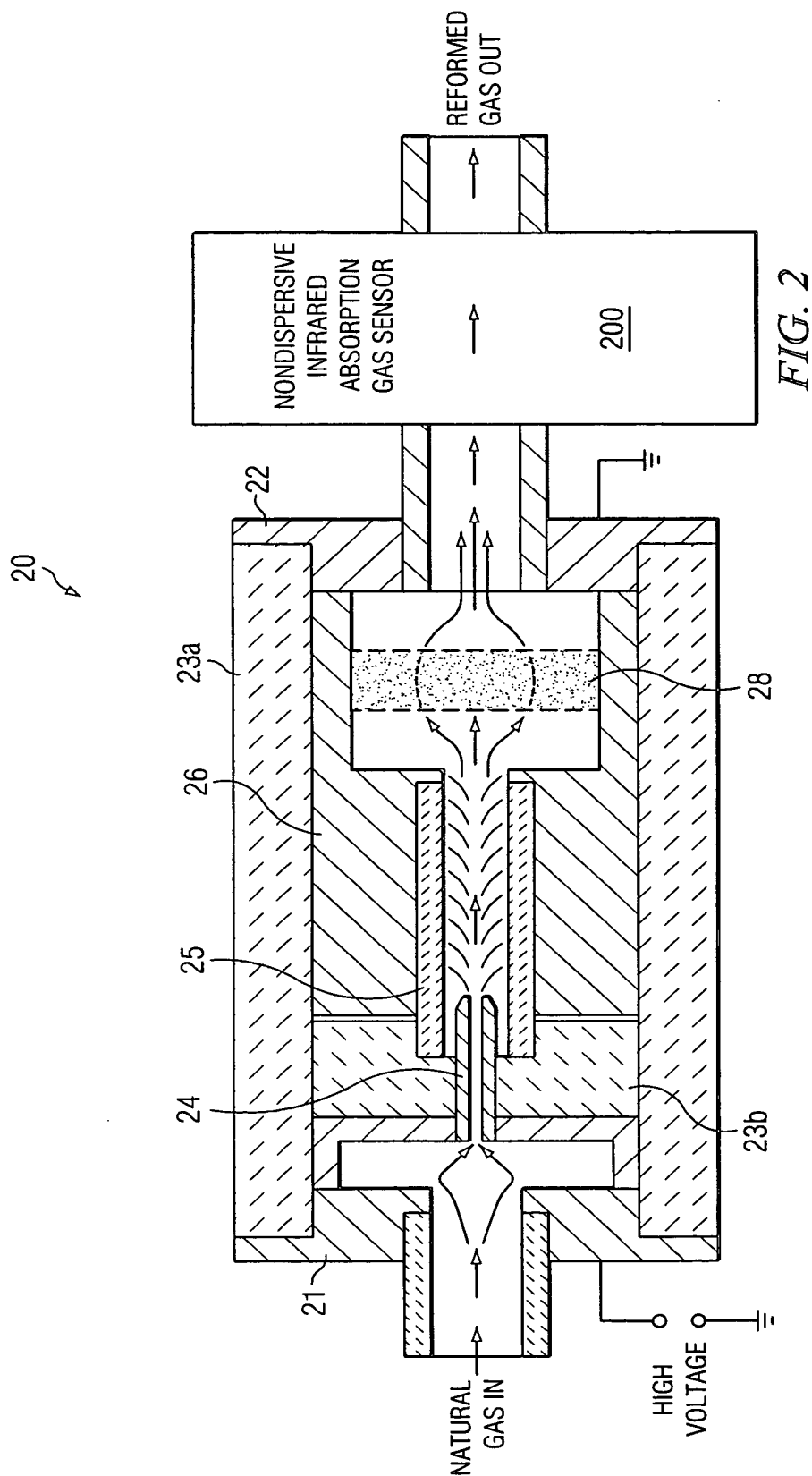
FIG. 1

MEASUREMENT OF NITROGEN CONTENT IN A
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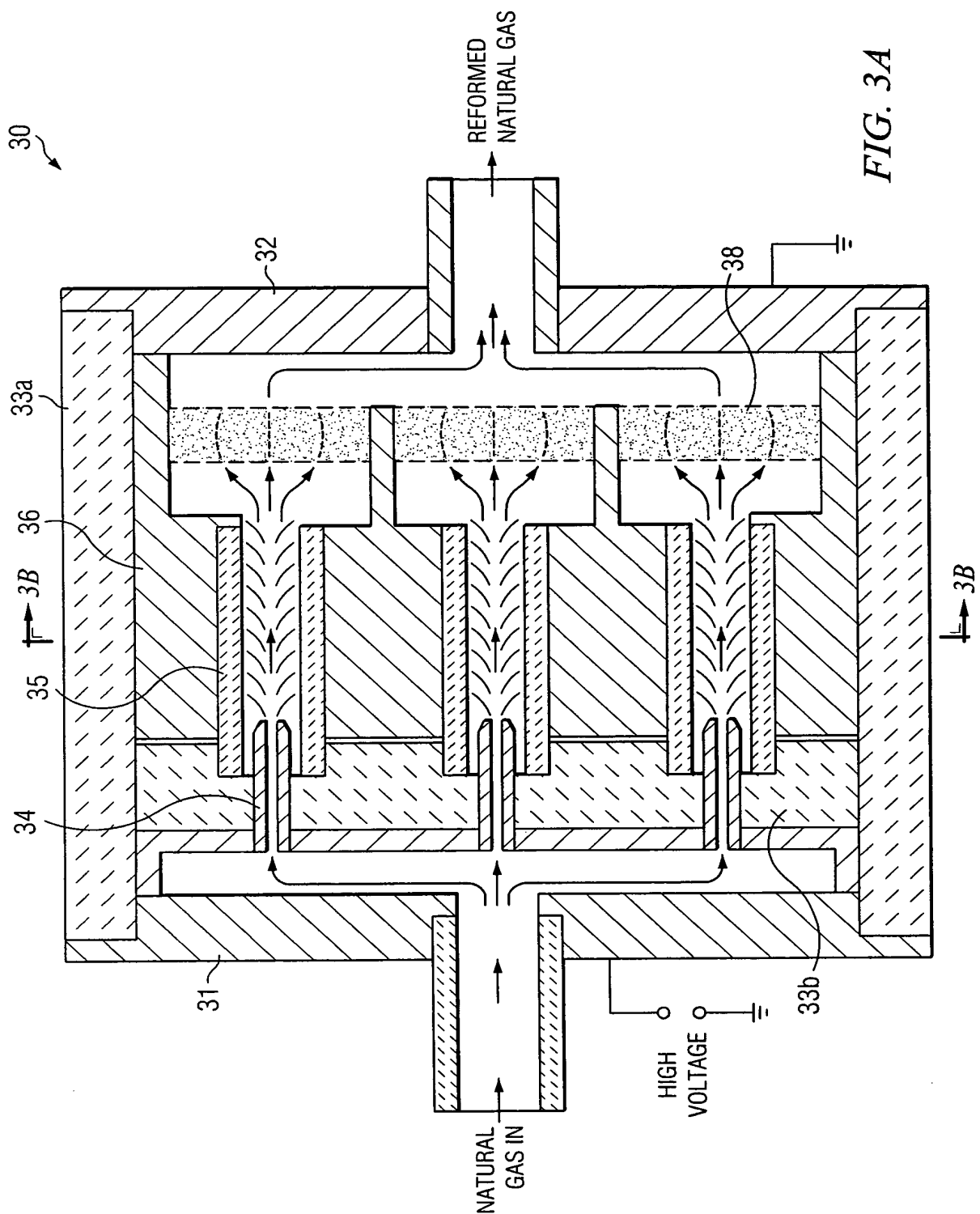


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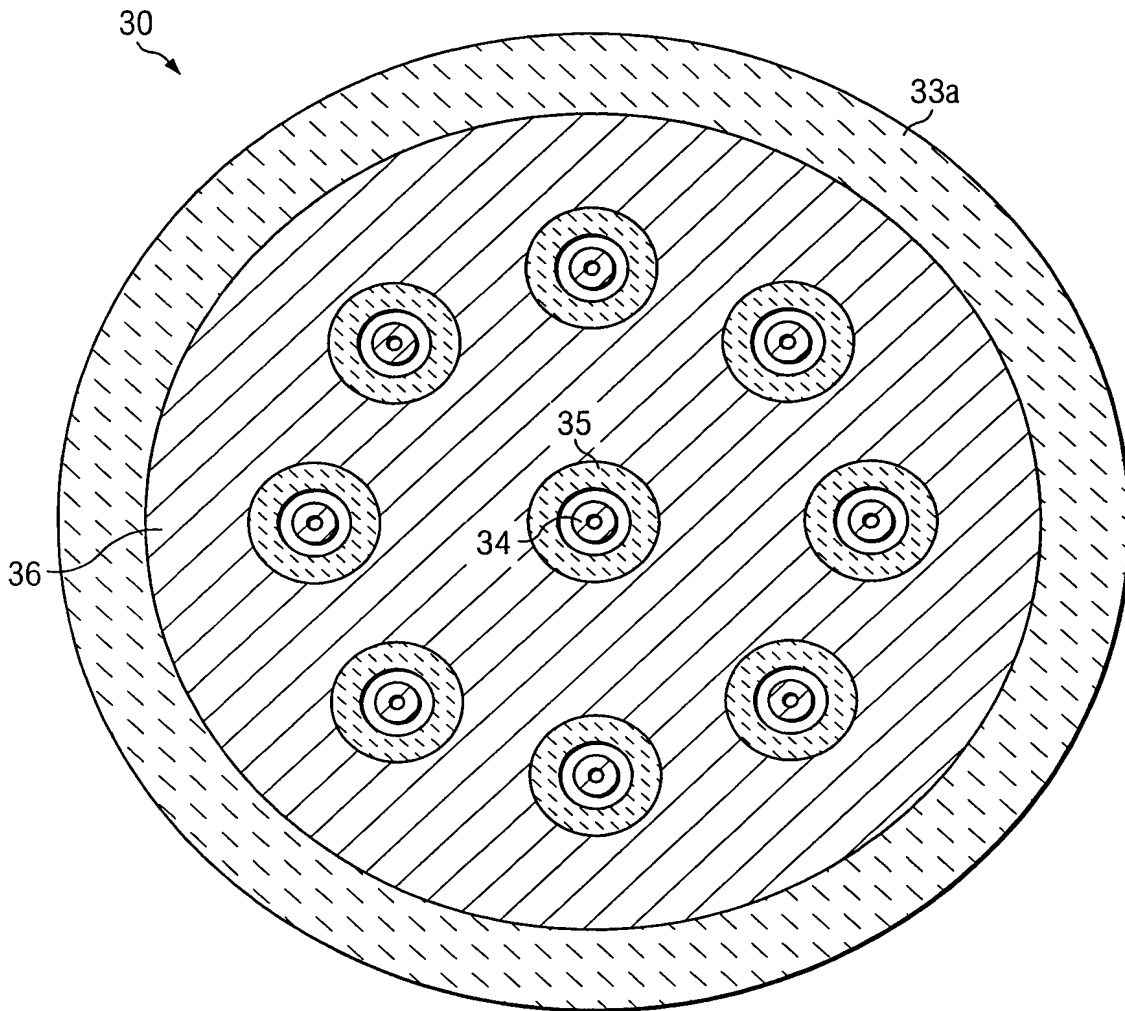


FIG. 3B

MEASUREMENT OF NITROGEN CONTENT IN A
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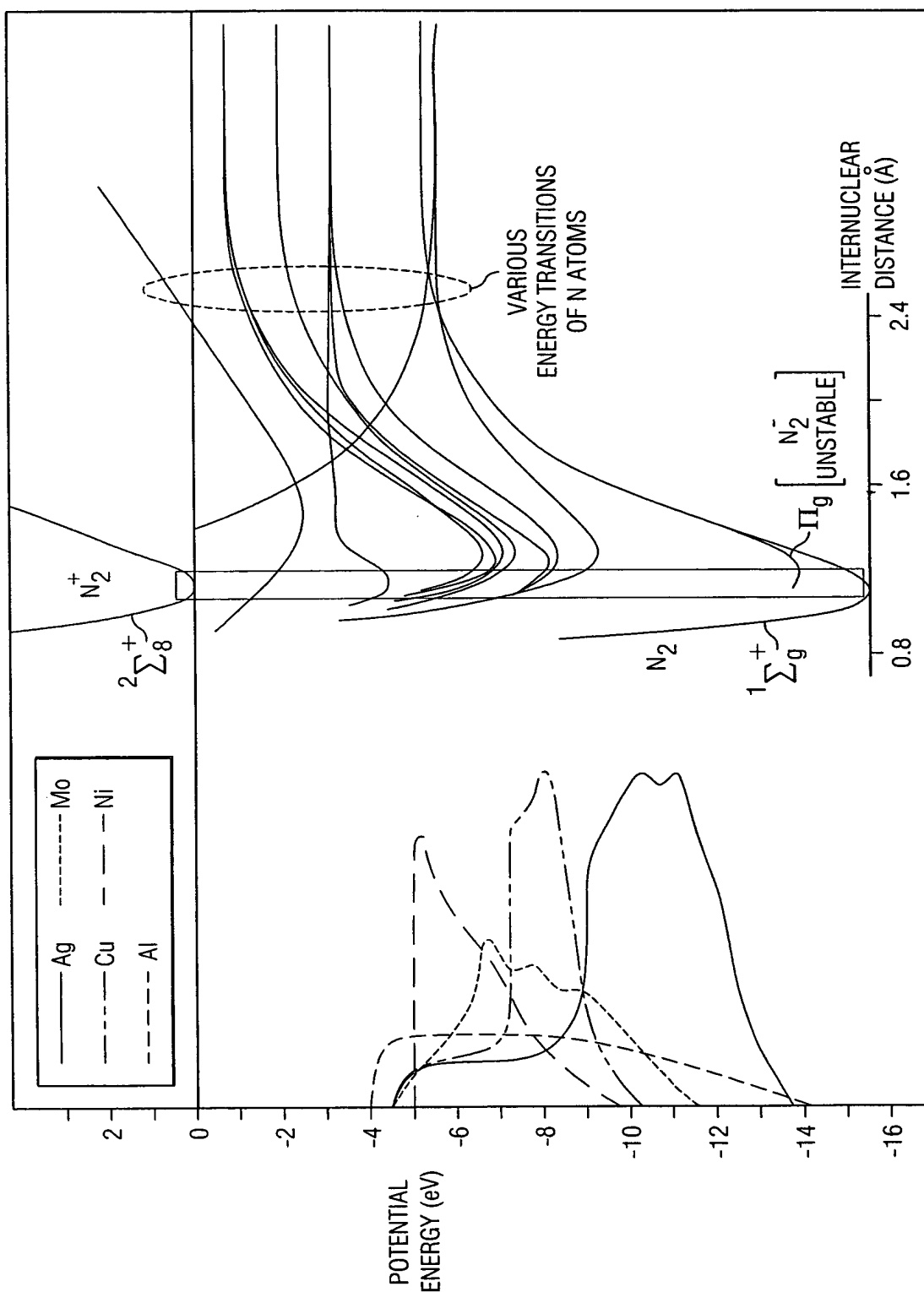


FIG. 4

MEASUREMENT OF NITROGEN CONTENT IN A
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